IN THE CLAIMS:

Please amend claims 1, 4, 5, 17-23, 26 and 27 as follows. Please cancel claim 3 without prejudice and add new claim 27.

1. (Currently Amended) A method of estimating the location of a mobile device, comprising ~~the steps of~~:

collecting location information;

selecting at least one of a plurality of different location methods to provide a location estimate said methods comprising using cell identity information; ~~and~~

providing a location estimate based on the at least one selected location method; and

determining a virtual base station estimate.

2. (Original) A method as claimed in claim 1 wherein said at least one location method comprises at least one of the following methods:

a method using cell identity information;

a method using cell identity information and received signal strength;

a method using cell identity information and timing advance information; and

a method using cell identity information, received signal strength information and timing advance information.

3. (Cancelled)

4. (Currently Amended) A method as claimed in claim 2, further comprising ~~the step of~~ determining a virtual base station estimate, wherein said virtual base station estimate is determined using at least one of the methods of claim 2.

5. (Currently Amended) A method as claimed in claim ~~3~~ 1, wherein said virtual base station location estimate coupled with at least one virtual measurement and at least one real measurement and said at least one virtual measurement is processed using a location method.

6. (Previously Presented) A method as claimed in claim 2, wherein said virtual base station location estimate coupled with at least one virtual measurement and at least one real measurement and said at least one virtual measurement is processed using a location method, and wherein the at least one real and the at least one virtual measurements are processed using a location method as defined in claim 2.

7. (Previously Presented) A method as claimed in claim 5, wherein a value for the virtual measurement is one of measured levels, a combination of measured levels, and an average of measured levels.

8. (Previously Presented) A method as claimed in claim 1, wherein said at least one location method is selected in dependence on the location information available.

9. (Previously Presented) A method as claimed in claim 1, wherein a plurality of location estimates are determined and at least one estimate is used to provide said location estimate.

10. (Previously Presented) A method as claimed in claim 1, wherein said location information is collected by said mobile device.

11. (Original) A method as claimed in claim 10, wherein said mobile device is arranged to measure a level of at least one type of information.

12. (Previously Presented) A method as claimed in claim 1, wherein said location information comprises at least one of timing advance information and received signal level.

13. (Original) A method as claimed in claim 12, wherein said received signal level is an absolute received signal level or relative received signal level.

14. (Previously Presented) A method as claimed in claim 1, wherein said mobile device is in a cellular communications device.

15. (Original) A method as claimed in claim 14, wherein said information is collected for a serving cell of the mobile device.

16. (Previously Presented) A method as claimed in claim 14, wherein said information is collected for at least one neighbouring cell.

17. (Currently Amended) A method as claimed in claim 14, further comprising ~~the step of~~ selecting the or each cell in respect of which location information is collected.

18. (Currently Amended) A method of estimating the location of a mobile device, comprising the steps of:

collecting location information;

selecting at least one of a plurality of different location methods to provide a location estimate said methods comprising using cell identity information; and

providing a location estimate based on the at least one selected location method,

~~A method as claimed in claim 1,~~ wherein a location estimate is provided using the following algorithm

Calculate the total attenuation experienced by a signal transmitted by the i-th BTS while propagating toward a mobile station where i-th level observation is L^i) by subtracting from the i-th measured received power, P^i_r, the maximum power radiated by the i-th BTS, $P^i_{t,max}$:

$$L^i = P_r^i - P_{t,max}^i \quad ; \quad i = 1,\ldots,N \qquad (11)$$

Stack the level observations from N BTS's in vector **L**:

$$\mathbf{L} = \left[L^1,\ldots,L^N\right]^T \qquad (12)$$

Solve the minimization problem:

$$\begin{bmatrix} \hat{\sigma_u}^2 \\ \hat{x} \\ \hat{y} \end{bmatrix} = \arg \min_{\begin{bmatrix} \sigma_u^2 \\ x \\ y \end{bmatrix}} F\left(x,y;\sigma_u^2\right) \qquad (13)$$

where the *cost function F (x,y; σ_u^2)* is defined as follows:

$$F\left(x,y;\sigma_u^2\right) = \ln \sigma_u^2 + \ln\left|\mathbf{r_L}(x,y)\right| + \frac{1}{\sigma_u^2}\left[\mathbf{L} - \mathbf{m_L}(x,y)\right]^T \mathbf{r_L}^{-1}(x,y)\left[\mathbf{L} - \mathbf{m_L}(x,y)\right] \qquad (14)$$

and

$$\mathbf{m_L}(x,y) = \left[\mu_L^1(x,y),\ldots,\mu_L^N(x,y)\right]^T \qquad (15)$$

$$\mu_L^i(x,y) = -\mathrm{PL}^i\left(d^i(x,y)\right) - AP_{tr}^i\left(\psi^i(x,y)\right) \qquad (16)$$

$$\left[\mathbf{r_L}(x,y)\right]_{ij} = \begin{cases} 1 & i = j \\ \rho_u^{i,j}(x,y) & i \neq j \end{cases} \qquad i,j = 1,\ldots,N \qquad (17)$$

19. (Currently Amended) A method of estimating the location of a mobile device, comprising the steps of:

collecting location information;

selecting at least one of a plurality of different location methods to provide a location estimate said methods comprising using cell identity information; and

providing a location estimate based on the at least one selected location method

~~A method as claimed in claim 1~~, wherein a location estimate is provided using the following algorithm

Calculate the total attenuation experienced by a signal transmitted by the i-th BTS while propagating toward a mobile station where the i-th level observation is L^i by subtracting from the i-th measured received power, P^i_r, the maximum power radiated by the i-th BTS, $P^i_{t,max}$:

$$L^i = P^i_r - P^i_{t,max} \quad ; \quad i = 1,\ldots,N \tag{18}$$

Stack level observations from N BTS's in vector $\mathbf{L}$:

$$\mathbf{L} = \left[L^1,\ldots,L^N\right]^T \tag{19}$$

Solve the minimization problem:

$$\begin{bmatrix} \hat{x} \\ \hat{y} \end{bmatrix} = \arg \min_{\begin{bmatrix} x \\ y \end{bmatrix} \in \mathcal{D}_{xy}} F(x,y) \tag{20}$$

where the *cost function* $F(x,y)$ is defined as follows:

$$F(x,y) = \sum_{i=1}^{N} \left(L^i + \mathrm{PL}^i(x,y) + AP_{tr}^i(x,y) \right)^2 \qquad (21)$$

and D_{xy} is the domain of existence of x and y.

Calculate $\hat{\sigma}_u^2$ as

$$\hat{\sigma_u}^2 = F(\hat{x},\hat{y}) \qquad (22)$$

20. (Currently Amended) A method of estimating the location of a mobile device, comprising the steps of:

collecting location information;

selecting at least one of a plurality of different location methods to provide a location estimate said methods comprising using cell identity information; and

providing a location estimate based on the at least one selected location method

~~A method as claimed in claim 1~~, wherein a location estimate is provided using the following algorithm:

Calculate the total attenuation experienced by a signal transmitted by the i-th BTS while propagating toward a mobile station where the i-th *level observation* is L^i) by subtracting from the i-th *measured* received power, Pt, the maximum power radiated by the i-th BTS, $P^i_{t,max}$:

$$L^i = P_r^i - P_{t,max}^i \quad ; \quad i = 1,\ldots,N \qquad (23)$$

Calculate the j-th *level difference observation* by subtracting the j-th level observation from the level observation L^1 taken as reference:

$$D^j = L^1 - L^j \quad ; \quad j = 2,\ldots,N \tag{24}$$

Stack the *N - 1* difference of level observations in a vector **D**:

$$\mathbf{D} = \left[D^2,\ldots,D^N\right]^T \tag{25}$$

Solve the minimization problem

$$\begin{bmatrix} \hat{x} \\ \hat{y} \end{bmatrix} = \arg \min_{\begin{bmatrix} x \\ y \end{bmatrix} \in D_{xy}} F(x,y) \tag{26}$$

where

$$F(x,y) = \sum_{j=2}^{N} \left(D^j - \mu_D^j(x,y)\right)^2 - \frac{1}{N}\left(\sum_{j=2}^{N} D^j - \mu_D^j(x,y)\right)^2 \tag{27}$$

and

$$\mu_D^j(x,y) = -\left[\mathrm{PL}^1\left(d^1(x,y)\right) - \mathrm{PL}^j\left(d^j(x,y)\right)\right] - \left[AP_{tr}^1\left(\psi^1(x,y)\right) - AP_{tr}^j\left(\psi^j(x,y)\right)\right] \tag{28}$$

D_{xy} is the domain of existence of x and y.

21. (Currently Amended) A method of estimating the location of a mobile device, comprising the steps of:

collecting location information;

selecting at least one of a plurality of different location methods to provide a location estimate said methods comprising using cell identity information; and

providing a location estimate based on the at least one selected location method

~~A method as claimed in claim 1~~, wherein a location estimate is provided using an algorithm solving the following equation in x and y:

$$\begin{cases} \sum_{i=1}^{N} F^i(x,y)\left(x - x^i\right) = 0 \\ \\ \sum_{i=1}^{N} F^i(x,y)\left(y - y^i\right) = 0 \end{cases} \quad ; \quad (x,y) \in \mathcal{D}$$

where

$$F^i(x,y) = \frac{2B^i/C^i(d_0)}{(2\pi)^{3/2}\,\sigma_u^i \ln 10} \frac{\exp\left\{-\frac{1}{2\sigma_u^{i\,2}}\left(B^i \log_{10} d^i(x,y) - z^i + A^i\right)^2\right\}}{[d^i(x,y)]^4} \cdot \left[\frac{B^i\left(B^i \log_{10} d^i(x,y) - z^i + A^i\right)}{2\sigma_u^{i\,2} \ln 10} - 1\right]$$

22. (Currently Amended) A method of estimating the location of a mobile device, comprising the steps of:

collecting location information;

selecting at least one of a plurality of different location methods to provide a location estimate said methods comprising using cell identity information; and

providing a location estimate based on the at least one selected location method

~~A method as claimed in claim 1~~, wherein a location estimate is provided using an algorithm solving the following equation in x and y:

$$\begin{cases} \sum_{i=1}^{N}\left[-\frac{\mathcal{I}_i}{|\mathbf{R}|}(x-x^i)-\frac{(\tilde{\mathcal{I}}_i-1)}{|\mathbf{R}|}\left\{(x^i)^2x-x^iy^i(y-y^i)\right\}\right]=0 \\ \sum_{i=1}^{N}\left[-\frac{\mathcal{I}_i}{|\mathbf{R}|}(y-y^i)-\frac{(\tilde{\mathcal{I}}_i-1)}{|\mathbf{R}|}\left\{(y^i)^2y-x^iy^i(x-x^i)\right\}\right]=0 \end{cases} \quad ; \quad (x,y)\in\mathcal{D}$$

23. (Currently Amended) A method of estimating the location of a mobile device, comprising the steps of:

collecting location information;

selecting at least one of a plurality of different location methods to provide a location estimate said methods comprising using cell identity information; and

providing a location estimate based on the at least one selected location method

~~A method as claimed in claim 1~~, wherein a location estimate is provided using an algorithm based on the following equation:

$$\hat{x}=\frac{\sum_{i=1}^{N}\frac{x^i}{\mathcal{I}_{i0}}}{\sum_{i=1}^{N}\frac{1}{\mathcal{I}_{i0}}} \quad ; \quad \hat{y}=\frac{\sum_{i=1}^{N}\frac{y^i}{\mathcal{I}_{i0}}}{\sum_{i=1}^{N}\frac{1}{\mathcal{I}_{i0}}} \quad ; \quad (\hat{x},\hat{y})\in\mathcal{D}$$

24. (Previously Presented) A method as claimed in claim 1, wherein said location estimate is provided by one of a iterative and a closed form method.

25. (Previously Presented) A method as claimed in claim 1, wherein said location estimate is provided by one of a linear and non linear method.

26. (Currently Amended) A system for estimating the location of a mobile device, comprising:

means for collecting location information;

means for selecting at least one of a plurality of different location methods to provide a location estimate said methods using cell identity information; ~~and~~

means for providing a location estimate based on the at least one selected location method; and

means for determining a virtual base station estimate.

27. (New) A system for estimating the location of a mobile device, comprising:

collecting unit configured to collect location information;

selecting unit configured to select at least one of a plurality of different location methods to provide a location estimate said methods using cell identity information; and

providing unit configured to provide a location estimate based on the at least one selected location method;

and determining unit configured to determine a virtual base station estimate.